UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

H. CRISTINA CHEN-OSTER; LISA PARISI; and SHANNA ORLICH, Plaintiffs, v. GOLDMAN, SACHS & CO. and THE GOLDMAN SACHS GROUP, INC. Defendants.	10 Civ. 6950 (AT) (JCF)

EXPERT REPORT OF MICHAEL P. WARD

Part 2 of 2

- Business Unit
- Function
- Years as an Associate or as a Vice President
- Years since IBD Class Year (for IBD Jr. Bankers only)
- Manager Quartile current and prior year
- Production in the current and prior year
- Client Representative Indicator and Production in the current and prior year (IBD only)
- 360 score, adjusted
- Whether a guarantee
- Office
- Education
- Lateral Hire Indicator (for MBD only)

The results of my analysis are set forth in Section XV below. For clarity, I have noted where differences in pay are seen at a level of "statistical significance" and where they are not.

G. Lateral Hires

At Goldman Sachs, as in many other companies, employees may reach their current position by being advanced through lower levels via promotion, i.e. "up through the ranks." Alternatively, employees may lateral into a non-entry-level position from outside the company. [redacted] They are a different group from a compensation perspective than the promoted employees.

Whether in professional sports teams, law firms, high tech, or finance, those hired laterally are typically paid more because they bring specialized skills or established business relationships with them—that is why they were recruited. The acquiring firm is generally buying an asset (e.g. "book of business") that it would not otherwise have access to or is filling a niche position that cannot be filled with internal candidates.

Because the compensation of laterals often involves guarantees and may be based on idiosyncratic productivity, they are not comparable to internally promoted employees. Also, there is no historical information on their production or performance that would allow the outside observer to tell why the lateral was paid more than an apparently similar internally promoted person. For example, the 2006 Compensation Overview has separate guidance for the compensation

of lateral hires.[87] Among the issues for consideration are: the current and historical compensation of the recruit, pay levels of peers in similar positions, external market value of comparable positions, near-term contribution and future potential of recruit, need/criticality of position.

[redacted] This has nothing to do with gender—in almost all statistical models of men or women alone the same effect was seen. While some information is retained in Goldman Sachs employee data on the identity of prior employers, there is no data to explain why laterals receive the compensation offers that they do.

[redacted]

The data I observed on lateral compensation and these declarations are consistent with the factors affecting compensation of lateral recruits throughout the financial services industry.[88] For this reason I analyze laterally hired men and women separately from internal promotes.

[87] GS0122851-867

[88] Expert Report of Michael P. Curran, December 11, 2013, section VI.

XV. ANALYSIS OF COMPENSATION

A. There is No Pattern of Pay Differences across Business Units

As discussed above, compensation recommendations at Goldman Sachs are made at (or below) the Business Unit level. The best approach to modeling this process would therefore be to estimate a separate regression model for each year and Business Unit combination.[89] Even within Business Unit, persons perform different functions which are valued and evaluated differently. However, the number of persons within the same Business Unit performing the same function within a given year is so small that it is not feasible to estimate pay regressions at this level. I therefore estimated the results at a more aggregate level and then split them up to show results by Business Unit for each of the Divisions.

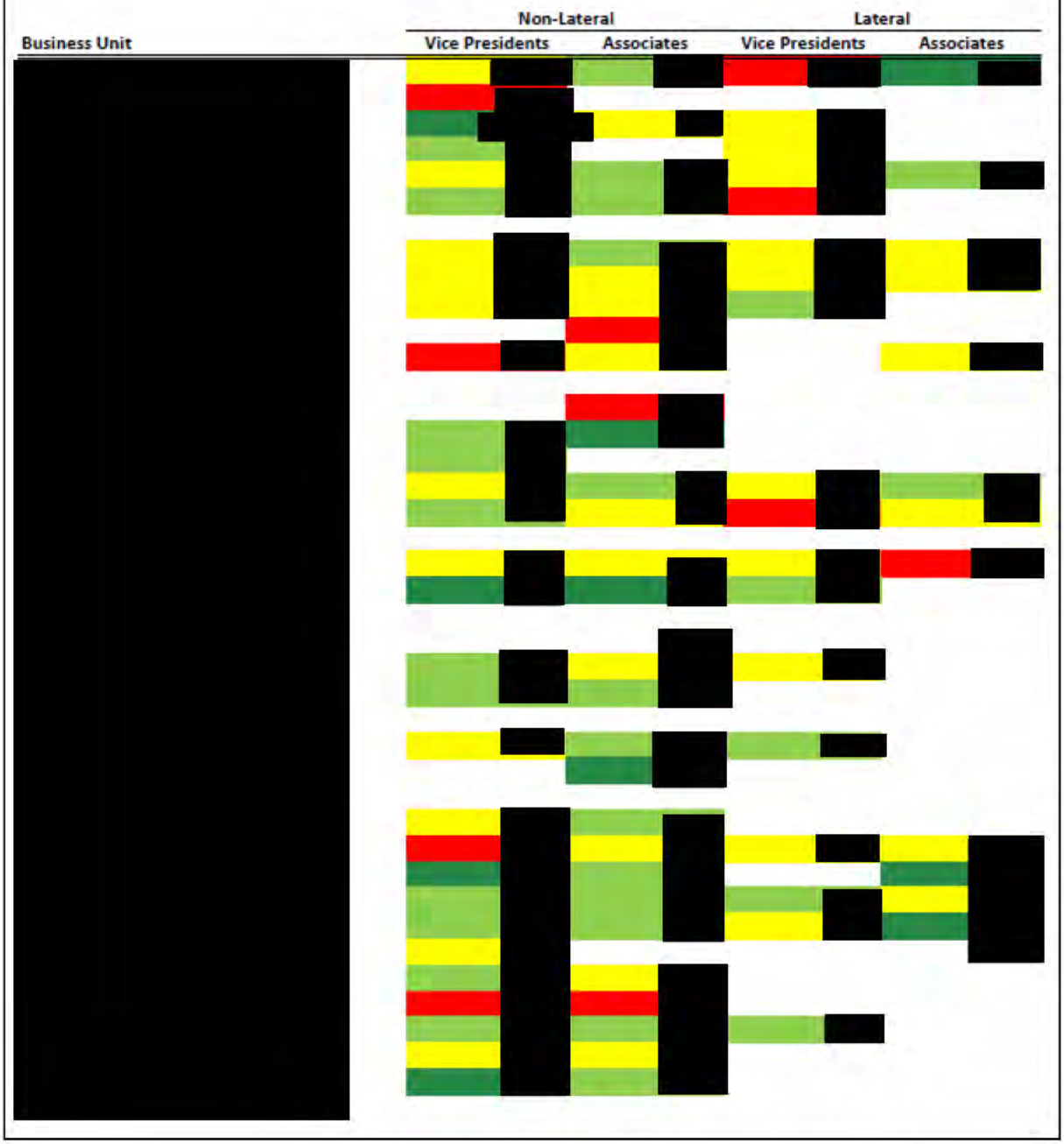
If there were in fact a systematic pattern of pay discrimination as Plaintiffs allege, I would expect to find the women in all Business Units similarly disadvantaged and that the differences would be statistically significant for most of the parts of the organization (e.g., Division, Business Unit, role). Statistics suggesting a pattern of discrimination would not show differences sometimes to the advantage of women and sometimes to the disadvantage of women, in an unsystematic fashion.

Figure 8 shows these gender differences for each Business Unit in the Securities Division. The numbers are color coded to indicate whether the statistic favors or disfavors women and whether the difference is statistically significant or not.[90] Dark green indicates that the difference favors women and is statistically significant, light green indicates that the difference in that Business Unit favors women but is not statistically significant. Yellow and red indicate that the difference disfavors women and is insignificant or significant, respectively. Each column of the Figure is a breakdown of the results for Vice President or Associate, and whether they were promoted or hired into the position.

[89] In some Securities Business Units decisions are actually made at the desk level, and this is therefore the most appropriate level of analysis. In fact, I performed statistical tests which confirm that compensation models differ across Business Units.

[90] Standard deviations shown in this figure, and in figures 9-12, are a translation of the probability level of the estimate into standard deviation units.

Figure 8
Business Unit Level Estimated Gender Differences in Compensation
Securities, 2007-2011



Non-Lateral
Lateral
Business Unit
Vice Presidents
Associates
Vice Presidents
Associates

Notes:
1) Red indicates a standard deviation less than or equal to -2.
2) Yellow indicates a standard deviation between -1.99 and 0.
3) Light green indicates a standard deviation between 0 and 1.99.
4) Dark green indicates a standard deviation greater than or equal to 2.
5) A reported difference that is not shaded indicates that too few observations were available to calculate a standard deviation.
6) No difference is reported if there are no men and women to compare.
7) The numbers reported are the regression-adjusted pay differences.

In the Figure as a whole there are 89 comparisons, one for each combination of Business Unit, corporate title (Associate or Vice President) and entry type (promoted or lateral). Of these results, 10 are statistically significantly favorable for women and 11 are significantly adverse to women. Overall, counting significant and insignificant findings together, 41 favor women and 48 are adverse to women. This is not the variety of results that I would expect if there were a systematic pattern of discrimination in pay across the Securities Division.

Figure 9 shows results by Business Unit for IBD. The aggregate result shown in Table 5 is reflected in the Figure. For Senior Bankers there are more differences that are adverse to women while the differences for Junior Bankers are approximately balanced. Even so, there are few Business Units that, individually, show significantly adverse differences.

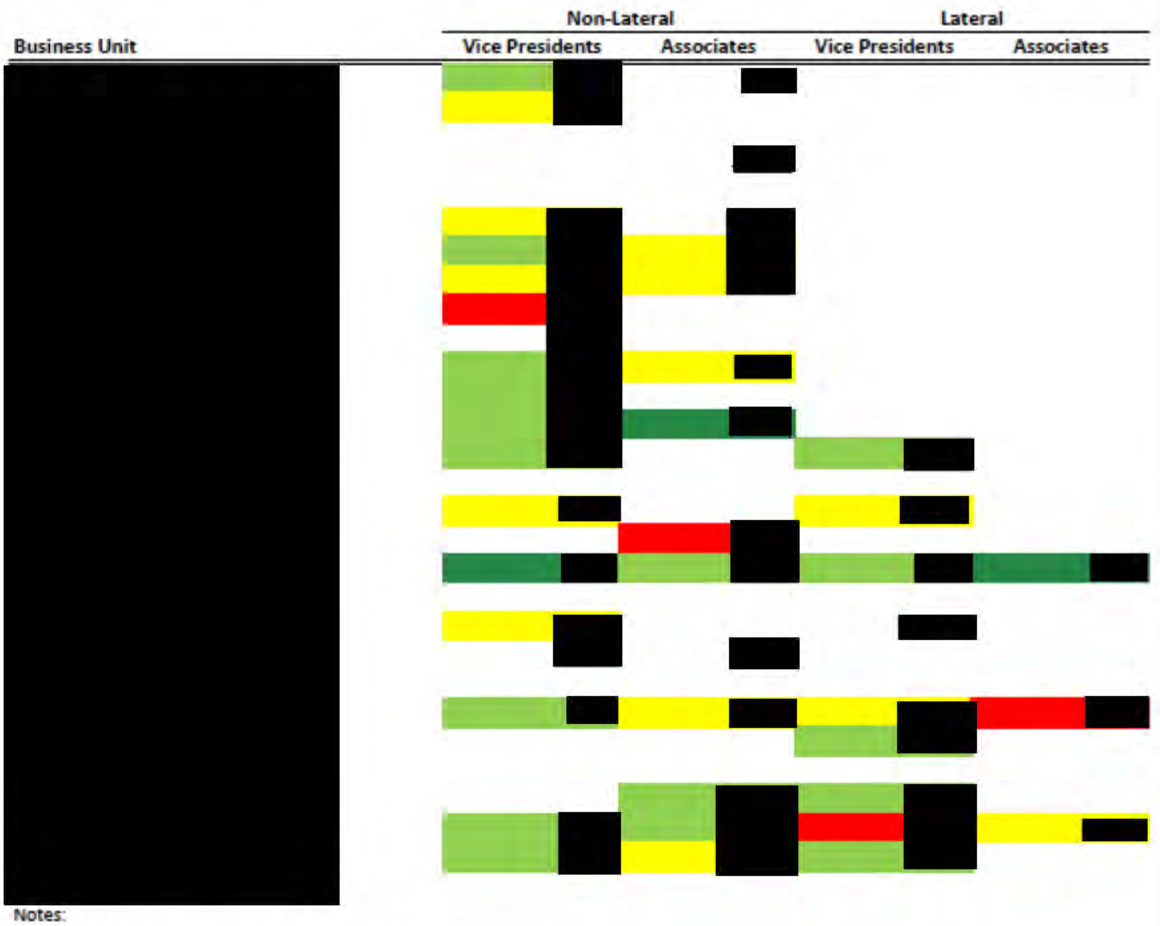
Figure 9
Business Unit Level Estimated Gender Differences in Compensation
IBD, 2005-2011

Notes:
1) Red indicates a standard deviation less than or equal to -2.
2) Yellow indicates a standard deviation between -1.99 and 0.
3) Light green indicates a standard deviation between 0 and 1.99.
4) Dark green indicates a standard deviation greater than or equal to 2.
5) A reported difference that is not shaded indicates that too few observations were available to calculate a standard deviation.
6) No difference is reported if there are no men and women to compare.
7) The numbers reported are the regression-adjusted pay differences.

Figure 10 shows results by Business Unit in IMD. As with the other Divisions, the overall statistic demonstrates large variation in results in the actual decision making units.

Figure 10
Business Unit Level Estimated Gender Differences in Compensation
IMD, 2008-2011

Figure 10
Business Unit Level Estimated Gender Differences in Compensation
IMD, 2008-2011



Notes:
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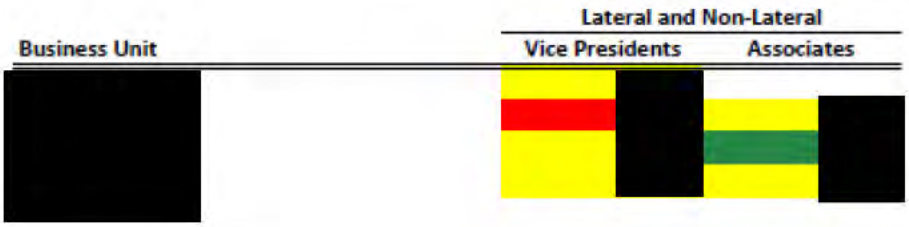
5) A reported difference that is not shaded indicates that too few observations were available to calculate a standard deviation.
6) No difference is reported if there are no men and women to compare.
7) The numbers reported are the regression-adjusted pay differences.

Figure 11 shows results by Business Unit in MBD.[91] There is one Business Unit with statistically significant favorable pay differences for women (Associates) and one that is adverse (Vice Presidents). Overall, the Business Unit statistics are completely balanced.

[91] Dr. Farber inexplicably dropped MBD from the studies in his Rebuttal Report and the Report submitted with Plaintiffs' Motion for Class Certification. However, because MBD is one of the Divisions identified in the First Amended Complaint and was identified as one of the studied Divisions in Dr. Farber's Initial Report, I have analyzed it here.

Figure 11
Business Unit Level Estimated Gender Differences in Compensation
MBD, 2007-2011



Notes:
1) Red indicates a standard deviation less than or equal to -2.
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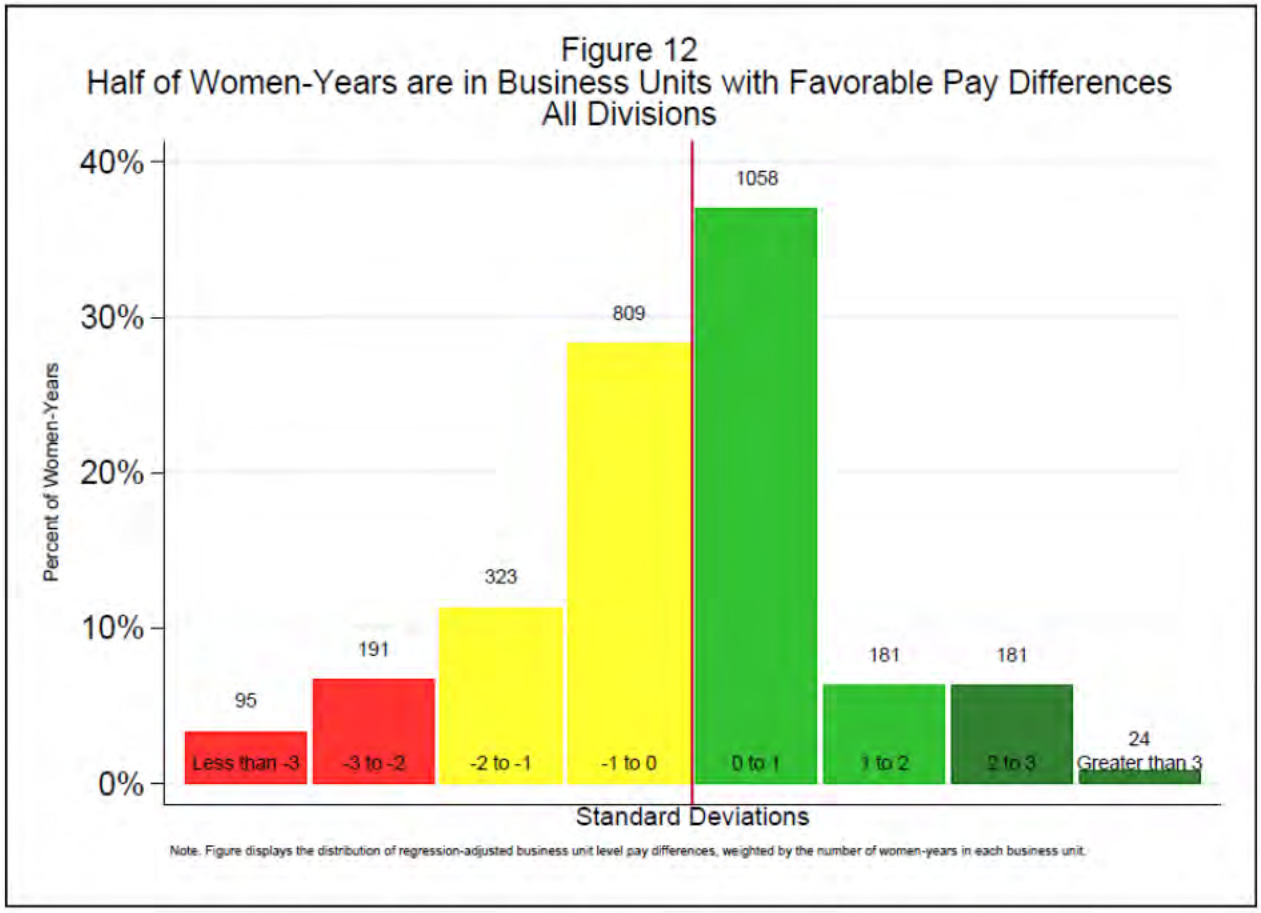
5) A reported difference that is not shaded indicates that too few observations were available to calculate a standard deviation.
6) No difference is reported if there are no men and women to compare.
7) The numbers reported are the regression-adjusted pay differences.

B. Over All Divisions, Business Unit Statistics Do Not Show a Pattern of Compensation Differences

Across all Business Unit results shown in Figures 8 through 11, there are 20 Business Units showing compensation differences that are significantly favorable to women, 86 that are favorable but not statistically significant, 102 adverse but not significant and 36 adverse and significant. These results, based on tallies of Business Units, do not tell us anything about the number of women affected by these various results. For example, there could be relatively more women in Business Units with adverse pay differences than there are in Business Units with favorable pay differences. I counted the number of women in each of the four categories shown in Figures 8 through 11. Figure 12 shows the total distribution of Business Unit outcomes weighted by the number of person-years for the women in each Business Unit. [92]

[92] In these statistics a unit of observation is a person-year, that is, a year of employment for one employee.



There are 286 person-years for women in which their compensation is significantly below that of similarly situated men. There are 205 person-years for women in which their compensation is significantly above similarly situated men. Overall, there are 1,418 person-years for women with adverse pay differences (whether statistically significant or not) and 1,444 person years for women with favorable pay differences. In short, when viewed from the perspective of a "randomly drawn" woman, the Business Unit differences are almost perfectly balanced. This randomly drawn woman is as likely to work in a Business Unit with statistically favorable outcomes as one with statistically unfavorable outcomes. Clearly, across all Business Units there is no statistical evidence of a pattern of compensation outcomes adverse for women.

C. Statistical Findings

As discussed above, my regression models for the Business Unit studies were estimated for each of the four Divisions, for Associates and for Vice Presidents separately.[93] I now demonstrate that even the results of these models at the Divisional level do not show a pattern of results adverse to women.

[93] Later, I show regression results for those hired laterally.

1. Securities

Table 4 below shows the results of my regression analyses of compensation in the Securities Division. The measure of compensation that I use is year-end PATC, and the models are estimated using the logarithm of PATC. This is the most common way that labor economists estimate compensation models. Differences in compensation can then be reported as percentage differences between the groups being studied, after adjusting for the other factors in the regression model. The results are virtually identical or statistically insignificant for both Associates and Vice Presidents.

Table 4

Estimated Gender Differences in Compensation

Promoted into Position

Securities, 2007-2011

Corporate Title	Number of Unique Employees	Men	Women	% Difference in PATC	Standard Deviations	R - Squared	RMSE
Vice President	1,370	1,057	313	[redacted]	[redacted]	80.8%	0.399
Associate	885	627	258	[redacted]	[redacted]	77.8%	0.360

Table 4 includes the population of employees who have 360 scores, manager quartiles and production data. Production data in Securities was retained from 2006 forward. Because I use both current year and prior year production I cannot estimate this regression model using data prior to 2007. I show below that production measures are critically important to explaining compensation differences.

In Table 4, regression results are shown for Vice Presidents and Associates.[94] The next three columns show the number of unique people included in the analysis, both the total and the number of men and women separately.[95]

The next column shows the estimated regression-adjusted percentage difference in PATC between the average man and woman. The next column marked "Standard Deviations" shows the statistical significance of this measured

[94] In the Table, differences that are to the disadvantage of women have a negative sign while those that are to the advantage of women have a positive sign.

[95] The counts displayed here are counts of unique employees included in each model. The number of person-years included in each model is higher, because the same employees are often included in multiple years. The standard deviations that I report account for the fact that the same people are included in the regression multiple times by clustering the standard errors.

percentage difference. When this number is above 2.0 or below -2.0 it is indicating that the pay difference is "statistically significant." Finally, the last two columns are measures of how well the regression models fit the data—the percentage of total variation in PATC explained by the model (R-squared) and the root mean square error (RMSE), discussed above.

The first row of Table 4 summarizes results for Vice Presidents in the Securities Division who were promoted into their position from the Associate level. Controlling for all factors in the model listed above, the average woman's PATC is estimated to be [redacted] below that of a "similar" man. The number of standard deviations associated with this difference is -[redacted]. Accordingly, the difference is not statistically significant. A difference this small could have arisen by chance alone.

The R-squared, or percentage of the variation in pay among employees explained by my model, for Vice Presidents is 80.8%, much higher than both the 23% and 44% reported by Dr. Farber.[96] This is due to two factors. First, my models are estimated separately for each level and Division, consistent with statistical tests that reject a more aggregate model. Second, I include production measures, which are important in explaining compensation differences both between men alone and between men and women.

The second line of the table shows the same analysis for those promoted into the Associate position. Between men and women who are promoted into the Associate position from Analyst, the average gender difference is [redacted]--virtually identical, within statistical accuracy and statistically insignificant.

In the Securities Division production data is available for a substantial percentage of employees; I test its impact on these results in order to assess whether it is an important factor to include in the models from a statistical perspective, as well as because the record shows that it is a significant part of compensation decision making. The regression models above were estimated using years of the data where production data was available. These models also include the majority of employees whose function did *not* record this information, e.g. Strats. Where relevant to an employee's role, production is an important variable explaining pay differences for both men and women. Production is highly significant in these regression models, indicating that it is, on its own, a very important factor explaining differences in compensation for both men and women.[97] In addition, it is important in explaining gender differences in compensation. Dr. Farber omitted production because "I can't just have a productivity measure for some subset of them." In fact, using production data creates no problem since, for some groups of employees, the concept does not exist or make sense given their role, e.g., someone in Securities Services or a Strat. However, where it does exist it is very important.

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[96] The backup data for Dr. Farber's preferred regression model for Vice Presidents (the model that does not control for 360 review score or manager quartile) shows an R-squared of 0.23, meaning that only 23% of the total variation in Vice President pay, among men and women, is explained by the variables in his model. Dr. Farber's model for Vice Presidents that includes controls for 360 review and manager quartile has an R-squared of 0.44. For Associates, these R-squareds are 0.33 and 0.49, respectively.

[97] As a contrast to the importance of gender, the "p-value" of production is on the order of 10^{-64}, far below the 0.05 level required for statistical significance and corresponding to more than 8 standard deviations.

Table 4A shows the same regression model as Table 4 over the same years as the studies above, except that I omit production from the model to show the contrast when it is not used. The two estimates of the gender difference are much larger. The difference for promoted Vice Presidents increases (in absolute value) from [redacted]. For promoted Associates it changes from being statistically insignificantly favorable for women [redacted]. When production data is missing, gender differences are inaccurately estimated and are larger than they would be were production data available. The importance of production in explaining the compensation of all employees for whom it is recorded, and the fact that the gender results are strongly affected by this factor, confirms the importance of using this data in an analysis seeking to explain pay differentials, including gender differences.

Table 4A

Estimated Gender Differences in Compensation without Productivity Controls

Promoted Into Position

Securities, 2007-2011

Corporate Title	Number of Unique Employees	Men	Women	% Difference in PATC	Standard Deviations	R - Squared	RMSE
Vice President	1,370	1,057	313	[redacted]	[redacted]	74.6%	0.459
Associate	885	627	258	[redacted]	[redacted]	68.3%	0.429

Table 4B shows the same regression model as in Table 4A, i.e. it omits production data, but it uses *all available years* of data and corresponds to Dr. Farber's data for the Securities Division. Gender differences are similar to those I found in Table 4A where I ignored the production data that I had for those later years. Because production data in Securities explains most of the statistical gender difference in compensation where I have it, I conclude that its omission is the cause of the larger gender differences seen in those years where I do not have it. Put differently, the absence of production data leads to biased estimates of gender differences in pay and, were production available for all years, those results would be similar to those in Table 4.

Table 4B

Estimated Gender Differences in Compensation without Productivity Controls

Promoted Into Position

Securities, 2003-2011

Corporate Title	Number of Unique Employees	Men	Women	% Difference in PATC	Standard Deviations	R - Squared	RMSE
Vice President	1,839	1,423	416	[redacted]	[redacted]	74.4%	0.450
Associate	1,474	1,052	422	[redacted]	[redacted]	73.4%	0.403

2. Investment Banking Division

Table 5 repeats the analysis for the Investment Banking Division (IBD).[98] For those promoted into the Senior Banker position the regression model estimates a [redacted] difference, disadvantageous to women, that is statistically significant under the *Hazelwood* 2-3 standard deviation standard.[99] The model for Junior Bankers estimates a gender difference that is small (less than one percent) and statistically insignificant.

[98] The analysis for IBD is restricted to 2005 forward because prior to 2005 360 data is not available for more than 98% of the relevant IBD population.

[99] Because IBD has very different compensation processes for Junior and Senior Bankers, for this Division I estimate separate models for Junior and Senior Bankers instead of for Associates and Vice Presidents.

Table 5

Estimated Gender Differences in Compensation

Promoted into Position

IBD, 2005-2011

Corporate Title	Number of Unique Employees	Men	Women	% Difference in PATC	Standard Deviations	R - Squared	RMSE
Sr. Banker	263	207	56	[redacted]	[redacted]	87.6%	0.185
Jr. Banker	673	472	201	[redacted]	[redacted]	89.0%	0.131

In IBD, the production number—for "deals"—is the same for all those involved in the deal. There is no individual attribution of credit, nor is there any quantification of how difficult the deal may have been to consummate. Hence, while the managers may be in a position to assess individualized contribution to the deal, that data is not available for analysis in IBD. In addition, I found the statistical impact of production in IBD to be erratic, sometimes showing negative (nonsense) patterns, i.e. more production meaning lower PATC. [redacted]

3. Investment Management Division

Table 6 shows results for IMD.[100] Again, gender differences between Vice Presidents who are promoted into that level are small on average and the same is true for Associates. For the 76% of women who are promoted into the Associate position in IMD the adjusted pay difference is essentially zero: [redacted] standard deviations.

[100] The IMD analysis is restricted to 2008 forward because prior to 2007 the IMD Division only recorded manager quartiles of 1 and 5 and my analysis includes the prior year's value of manager quartile.

Table 6

Estimated Gender Differences in Compensation

Promoted Into Position

IMD, 2008-2011

Corporate Title	Number of Unique Employees	Men	Women	% Difference in PATC	Standard Deviations	R - Squared	RMSE
Vice President	399	255	144	[redacted]	[redacted]	74.9%	0.314
Associate	266	170	96	[redacted]	[redacted]	78.1%	0.262

Although employees in Private Wealth Advisor positions have been excluded from our analysis population at the request of counsel, I have analyzed them separately and confirmed that there is no significant gender difference in their compensation.

Table 7

Estimated Gender Differences in Compensation

Promoted and Lateral into Position

IMD PWAs, 2009-2011

Corporate Title	Lateral Hire ?	Number of Unique Employees	Men	Women	% Difference in PATC	Standard Deviations	R - Squared	RMSE
Vice President	No	208	182	26	[redacted]	[redacted]	94.5%	0.167
Vice President	Yes	61	46	15	[redacted]	[redacted]	96.1%	0.146
Associate	No	126	95	31	[redacted]	[redacted]	84.5%	0.073
Associate	Yes	23	14	9	[redacted]	[redacted]	98.1%	0.047

4. Merchant Banking Division

For each of the regression models for MBD I have collected together laterals and non-laterals.[101] Due to the small size of the Division, there are too few observations of men and women to allow for separate models for laterals and non-laterals.[102] The estimated gender differences are marginally statistically significant for Vice Presidents, while Associates are favored statistically.

[101] The MBD analysis is restricted to 2007 forward because prior to 2006 the MBD Division only recorded Manager Quartiles of 1 and 5 and my analysis includes the prior year's value of manager quartile.

[102] I do add a lateral hire indicator to my set of regression controls.

Table 8

Estimated Gender Differences in Compensation

Promoted and Lateral into Position

MBD, 2007-2011

Corporate Title	Number of Unique Employees	Men	Women	% Difference in PATC	Standard Deviations	R - Squared	RMSE
Vice President	63	48	15	[redacted]	[redacted]	82.4%	0.235
Associate	39	25	14	[redacted]	[redacted]	89.4%	0.125

5. Laterals

Table 9 brings together the regression results for each Division and each corporate title using those who came laterally to the position. [redacted] Nevertheless, the striking difference between men and women who lateral into their positions as compared to those promoted into them cannot be explained with the kinds of information available in Goldman Sachs' computerized data.

Table 9

Estimated Gender Differences in Compensation

Moved Laterally Into Position

Securities, IBD, and IMD Divisions

Division	Corporate Title	Number of Unique Employees	Men	Women	% Difference in PATC	Standard Deviations	R-Squared	RMSE
Securities	Vice President	576	503	73	[redacted]	[redacted]	77.8%	0.396
Securities	Associate	426	334	92	[redacted]	[redacted]	82.6%	0.252
IBD	Sr. Banker	144	125	19	[redacted]	[redacted]	78.9%	0.235
IBD	Jr. Banker	197	160	37	[redacted]	[redacted]	85.2%	0.181
IMD	Vice President	280	208	72	[redacted]	[redacted]	73.0%	0.325
IMD	Associate	111	80	31	[redacted]	[redacted]	85.3%	0.204

While there is some limited information about the prior positions of these laterals, it does not gauge why one person was paid more than another. Below are some examples of Associates hired laterally in 2010:

[redacted]

As noted above, there are idiosyncratic considerations in determining the pay of these lateral acquisitions—their prior compensation history and the criticality of the need to fill that position. Whatever the cause, the gender difference in pay for this group is not shared by the overwhelming majority of women who enter this position via promotion.

XVI. ROUND CHANGES

A. PATC Changes Over Compensation "Rounds" Advantage Women More Than Men

Plaintiffs claim a centralized process exists through which a "small corps of managers" (Paragraph 46 of their Amended Complaint) manipulate decisions in a systematic manner to disadvantage women in setting PATC. Plaintiffs apparently allege that a small number of high level managers consistently overturn the decisions of lower level managers to the disadvantage of women. To study this allegation, I focus on a subset of the data for Securities from 2006 to 2011, which records details on lower level manager decisions and higher level review for different "rounds" of the compensation process.[103]

To the extent higher level managers were working in concert to reduce the PATC of women, I would expect to see a consistent and statistically significant pattern of women being disadvantaged moving through the various rounds of the compensation process, what I call the "rounding process"—for example, women receiving more decreases in their initial proposed PATC over the course of the rounds. In fact, I see that women are more often than not advantaged in the progression through compensation rounds. To the extent that there are higher level manager reviews, they tend to benefit women more often than not.

The data I analyze include information from the initial manager recommendation, through subsequent within-Division compensation meetings, through subsequent rounds (if any), and ultimately close with each employee's PATC being finalized. Each year may have different numbers of "rounds," as the financial circumstances associated with a particular year warranted.

In four of the six years I analyze for Vice Presidents, the percentage change in PATC from the initial manager recommendation to the final PATC value, on average, favored women relative to men. Likewise, in four of the six years I analyze for Associates the percentage change in PATC through the rounding process favored women, on average, relative to men. In other words, in eight of the twelve corporate title/fiscal year comparisons I analyze, women's pay was adjusted upwards relative to that of men during the compensation rounds; higher level manager reviews of PATC at Goldman Sachs tend to favor women in the Securities Division relative to men.

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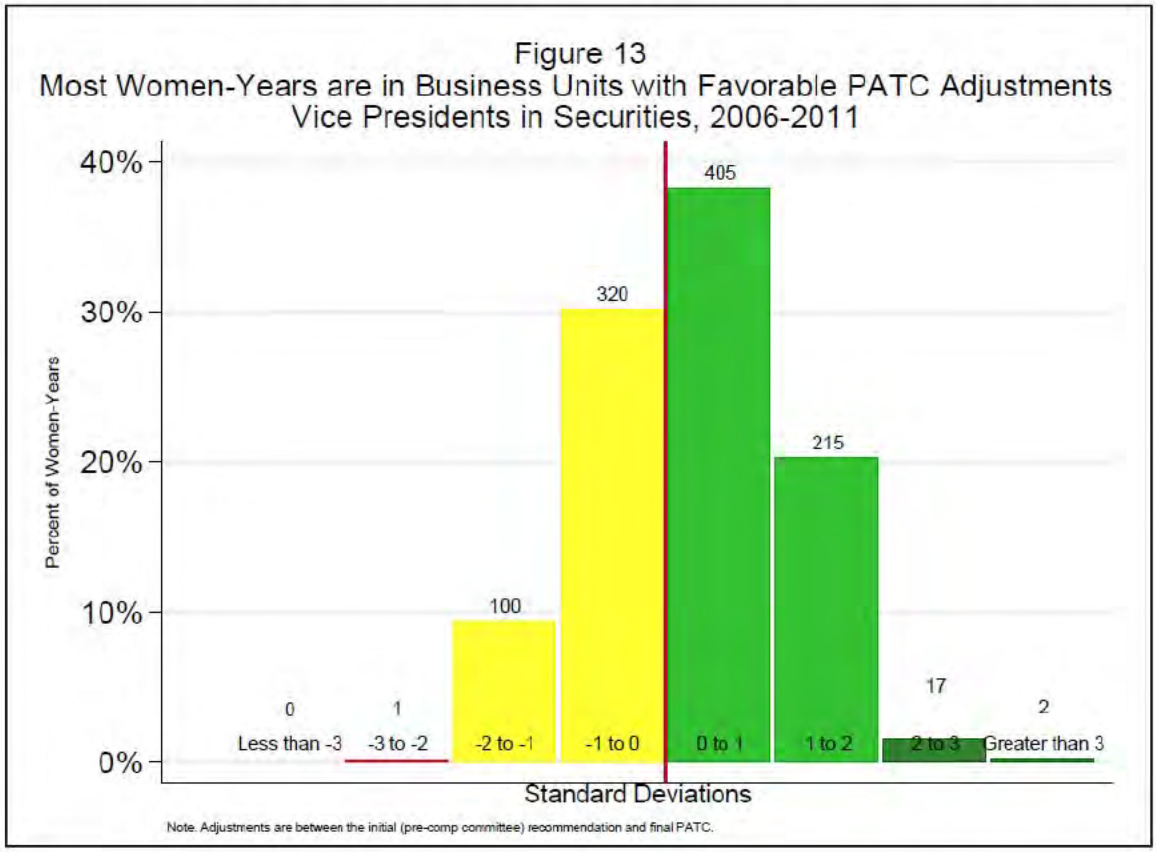
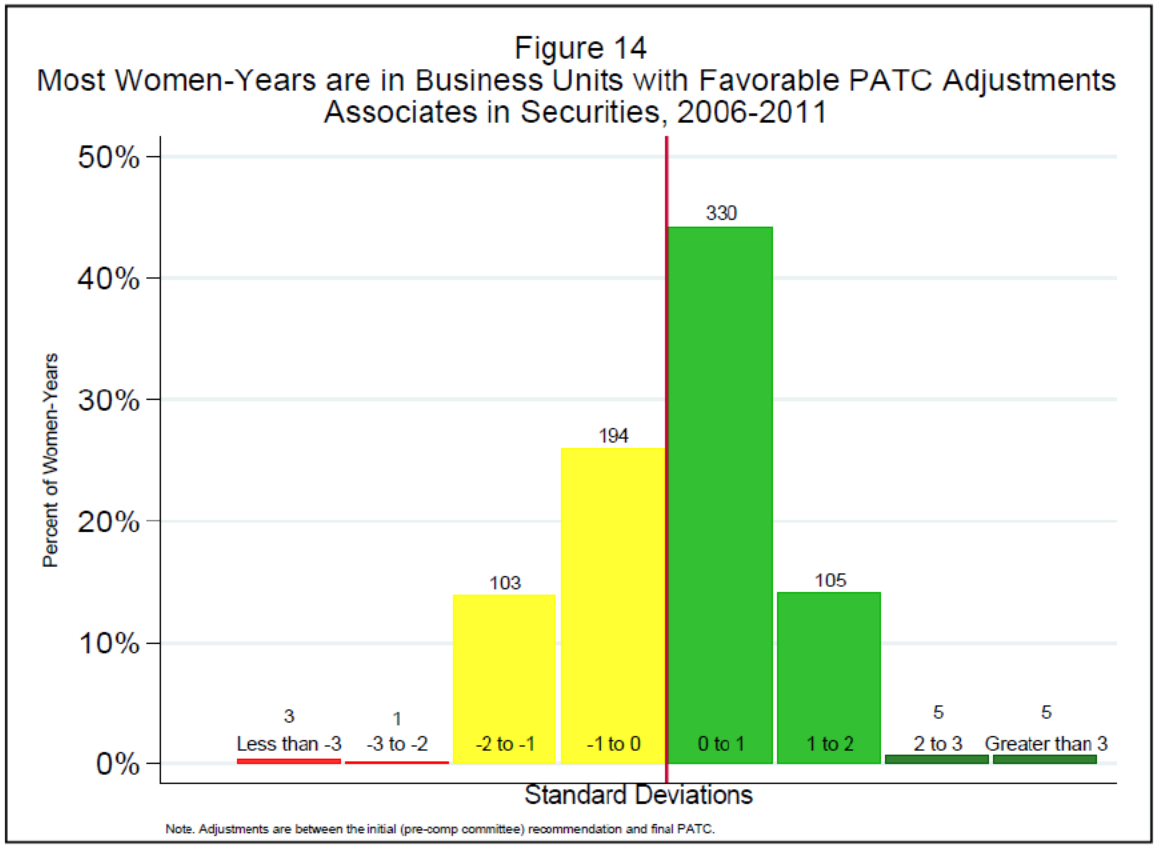
[103] Only in Securities is the first recommendation of the lower level compensation managers preserved; in other Divisions the first recorded number in the data is the number recorded after the first compensation committee meeting. (Heller Deposition, Pages 76-77).

Figures 13 and 14 present evidence on the distribution of percentage changes in PATC by Business Unit and fiscal year for Associates and Vice Presidents in Securities. Business Units are weighted by the number of women employed in the unit. Figure 13 shows that over 60% of female Vice Presidents worked in Business Units (and fiscal years) where the later rounds advantaged women's compensation relative to that of male Vice Presidents. Figure 14 indicates that just fewer than 60% of female Associates worked in Business Units (and fiscal years) where the rounding process advantaged women's compensation relative to that of male Associates. Many of the gender differences in the percentage adjustments in compensation in the rounding process are insignificantly different from zero, at the Business Unit level, as illustrated in Figures 13 and 14. However, two conclusions are clear: first, gender differences in the percentage adjustment in PATC that occur in the rounding process vary by Business Unit and fiscal year. Second, if a pattern exists it is one where subsequent rounds of higher level manager review tend to favor women relative to men; in four of six fiscal years the rounding process favored women relative to men, for both Associates and Vice Presidents.





XVII. ANALYSIS OF PROMOTION OF VICE PRESIDENTS

In this section I discuss the promotion of Vice Presidents to EMD. I first briefly summarize the processes and criteria used to identify and select candidates for this promotion, and then present my statistical analyses of the role of gender in the promotion outcomes.

A. Selection Processes

The decisions about promotion to EMD occur in two stages. In the first stage, Vice Presidents are nominated for consideration. The nominating process is somewhat different in each Division. For many years, through 2007, any Managing Director ("MD") including both EMDs and Participating Managing Directors ("PMDs") could nominate a Vice President for promotion to EMD through a nominations website. After 2007, the process changed. Currently, in a large Division such as Securities, the Business Unit heads meet with their managers to discuss candidates from their Business Units. The Business Units then submit their candidate lists to HCM and the Division executive committee, who evaluate the number and distribution of candidates across the Division and provide guidance to the Business Units about where more or fewer candidates are desired. A consensus is then reached about a final list of candidates to be evaluated during the cross-ruffing process.[104]

[104] See the Heller Deposition, Pages 203 – 231 for discussion of promotions in Securities.

Criteria for nomination are more detailed in IBD and IMD. These Divisions have experience standards that vary according to class year and level of education. In IMD a candidate is also expected to already be functioning at an EMD level position in the sense that he/she is in "a broad impactful role managing people, clients, or projects."[105]

In the second stage, nominees are evaluated through a process called "cross ruffing," in which existing MDs in the candidate's Division conduct in-depth interviews with current MDs who work with and know the candidate well. The average number of interviews conducted for each such candidate can exceed 12. Promotion lists are made at the Division level, constrained by the Firm's annual limitations on the number of promotions that it will make.

B. Statistical Analysis

For my analysis, I developed regression models to analyze the nomination and selection stages separately, as well as to analyze the combined results of these stages (i.e., the selection of EMDs from the full population of qualified Vice Presidents).[106] For IBD I analyze only Senior Bankers. Because almost all nominees and promotes to EMD received a Manager Quartile of "1" or "2/3" in the fiscal year that they were promoted, I restrict my analysis to the population of Vice Presidents with these Manager Quartile scores.[107]

I estimate the regression models separately for each of the three Divisions, [108] and also separately for those laterally hired into Vice President and those promoted to Vice President. Analyzing the lateral hires separately is important because their prior experience contributes to their chances for promotion, but it is not measured well in the available data. In the models that combine laterals and other Vice Presidents, the laterals have a higher probability of selection for a given level of Goldman Sachs experience than the candidates promoted into the Vice President position internally.

To properly compare persons who are "similarly situated" for selections to EMD, I include a set of factors similar to the ones that I included in my compensation regression models:

- Fiscal Year
- Years as a Vice President
- Manager Quartile in the current and prior year
- Production in the current and prior year

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[105] IMD VP/ED, Associate, Senior Analyst Promotions 2010 Year-End Nomination Criteria (GS0119970).

[106] Because nominations and promotions are binary outcomes, I use a logit regression model.

[107] I exclude 16 nominees who had Manager Quartile scores of 4, 5, or missing in the year that they were promoted (0.8% of nominees) and one promote who had a missing Manager Quartile score in the year of promotion. I also exclude 33 nominees and 17 promotes who were missing 360 scores in the year they were promoted.

[108] I observe too few selections in MBD to estimate standard deviations for any of my models.

- 360 score, adjusted
- Education

Table 10 displays the results of my promotions analysis. Each line of Table 10 shows the population and decision being analyzed: Division, whether the employees being compared were lateral hires into their current Title, and whether the nomination, promotion, or both decisions are being analyzed. The next four columns show the number of person-years included in the analysis, both the total and the number of person-years of men and women separately, and the percent female among these person-years. The next four columns repeat the same counts and percentages, but only for the nominees and promotes.

The next two columns show the number of female promotes (or nominees) that the model expects and the surplus or shortfall in promotions (or nominations), which is just the difference between the actual and expected numbers. The final column, marked "Standard Deviations," shows the statistical significance of the model's estimated gender difference.

The first row analyzes selection of Vice Presidents who promoted to their current position from within the Firm to the Nominee List. There are 2,900 person-years in this model, 592 (20.4%) of these are women. Among this population 281 persons were nominated to the EMD list, 61 (21.7%) of these are women. The model only expected 44.4 of these nominees to be women, resulting in an excess of 16.6 persons and a model standard deviation of +2.96.

These results show no pattern of selections adverse to women. Out of 18 comparisons, 5 are statistically significant and favorable to women, 5 are statistically insignificant and favorable to women, 7 are statistically insignificant and averse to women, and 1 is statistically significant and adverse to women.

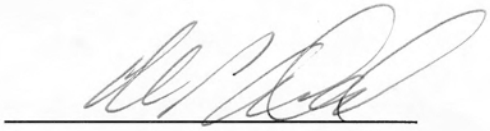
Women are more likely than similar men to be promoted to EMD. This has nothing to do with the years I analyze or with the detailed set of factors that I include in these models. To show this I used Dr. Farber's model for promotions but I extended this to all years available. These include promotions occurring from 2004 until 2011. I include only a single measure of performance: manager quartile. With this single added factor I find that promotion rates for women were *higher* than promotion rates for men, although the difference is not statistically significant.

Table 10

Estimated Gender Differences in EMD Selections

Securities 2007-2011, IBD 2005-2011, IMD 2008-2011

Division	Lateral Hire	Outcome	Person-Year Count	Male	Female	Percent Female	Select	Male Select	Female Select	Percent Female Among Selections	Expected Female Selections	Shortfall / Surplus	Std. Dev.
Securities	Non-Lateral	Selected to Nominee List	2,900	2,308	592	20.4%	281	220	61	21.7%	44.43	16.57	2.96
Securities	Non-Lateral	Promoted from Nominee List	281	220	61	21.7%	158	129	29	18.4%	29.56	-0.56	-0.22
Securities	Non-Lateral	Promoted from Full Pop	2,900	2,308	592	20.4%	158	129	29	18.4%	21.93	7.07	2.05
Securities	Lateral	Selected to Nominee List	1,014	906	108	10.7%	114	102	12	10.5%	8.22	3.78	1.42
Securities	Lateral	Promoted from Nominee List	114	102	12	10.5%	59	53	6	10.2%	6.18	-0.18	1.09
Securities	Lateral	Promoted from Full Pop	1,014	906	108	10.7%	59	53	6	10.2%	3.10	2.90	2.01
IBD	Non-Lateral	Selected to Nominee List	442	365	77	17.4%	169	148	21	12.4%	24.23	-3.23	-0.95
IBD	Non-Lateral	Promoted from Nominee List	169	148	21	12.4%	102	89	13	12.7%	10.67	2.33	1.16
IBD	Non-Lateral	Promoted from Full Pop	442	365	77	17.4%	102	89	13	12.7%	12.58	0.42	0.20
IBD	Lateral	Selected to Nominee List	266	224	42	15.8%	90	84	6	6.7%	12.70	-6.70	-3.03
IBD	Lateral	Promoted from Nominee List	90	84	6	6.7%	44	40	4	9.1%	1.72	2.28	9.10
IBD	Lateral	Promoted from Full Pop	266	224	42	15.8%	44	40	4	9.1%	6.41	-2.41	-1.81
IMD	Non-Lateral	Selected to Nominee List	820	532	288	35.1%	80	55	25	31.3%	25.95	-0.95	-0.22
IMD	Non-Lateral	Promoted from Nominee List	80	55	25	31.3%	48	33	15	31.3%	15.70	-0.70	-0.49
IMD	Non-Lateral	Promoted from Full Pop	820	532	288	35.1%	48	33	15	31.3%	16.08	-1.08	-0.36
IMD	Lateral	Selected to Nominee List	509	396	113	22.2%	51	34	17	33.3%	8.89	8.11	3.65
IMD	Lateral	Promoted from Nominee List	51	34	17	33.3%	30	23	7	23.3%	12.04	-5.04	-1.35
IMD	Lateral	Promoted from Full Pop	509	396	113	22.2%	30	23	7	23.3%	4.88	2.12	1.30



Michael P. Ward, Ph.D.

July 1, 2014

Date